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U. S. Nuclear Regulatory Commission
Washington, D. C. 20555-0001
Attention: Document Control Desk

Subject: Duke Energy Carolinas, LLC
McGuire Nuclear Station, Units 1 and 2
Docket Number 50-369 and 50-370
Catawba Nuclear Station, Units 1 and 2
Docket Number 50-413 and 50-414

Report Pursuant to 10 CFR 50.46, Changes to or Errors in an ECCS Evaluation Model

10 CFR 50.46 (a)(3)(ii) requires the reporting of errors or changes in the Emergency Core Cooling System (ECCS) evaluation model. This report covers the time period from January 1, 2007 to December 31, 2007. During this time period, there were no errors or evaluation model changes identified by Westinghouse that exhibited changes in Peak Cladding Temperature (PCT) results.

However, Westinghouse did evaluate a plant modification for the additional containment metal mass associated with the installation of new sump strainers at all four McGuire/ Catawba units. The minimum containment pressure analysis was rerun for comparison with the existing analysis of record. During the reflood phase where containment pressure can influence PCT, the maximum reduction in containment pressure was negligibly small (0.01 psig). Therefore, it was concluded that the additional containment metal mass due to the new sump strainers has a negligible impact on the containment pressure and PCT results for the McGuire/Catawba units. Since there was no PCT impact due to this plant modification, it is not included in the PCT summary tables.

In addition, three non-discretionary changes were made to the large break Loss of Coolant Accident (LBLOCA) evaluation model, and three non-discretionary changes were made to the small break LOCA (SBLOCA) evaluation model. The specific details of these changes are provided in Table 1 and were not considered to have an impact on the calculated PCTs. Since there was no PCT impact due to these non-discretionary changes, they are not included in the PCT summary tables.

For completeness, Westinghouse also informed Duke of a number of discretionary coding changes that were made as part of normal code maintenance and general code cleanup for the SBLOCA analysis. These represent various changes (such as removing

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inactive coding, enhancing code output, improving input diagnostic checks, etc.) made to enhance the usability of the codes and to help preclude errors in analyses. These changes are not considered to be errors or evaluation model changes and were therefore not considered to have an impact on calculated PCTs. As such, they are not included in the PCT summary tables.

Except for the MOX lead assemblies in Catawba Unit 1, all McGuire and Catawba units were loaded with a core comprised entirely of Westinghouse fuel for the calendar year 2007. Therefore, no transition core PCT penalties are included in the PCT summary tables.

A summary of the PCT changes for McGuire Units 1 and 2 and Catawba Unit 1 is provided in Table 2, and Table 3 provides a summary of the PCT changes for Catawba Unit 2.

There are no regulatory commitments associated with this letter.

Please address any comments or questions regarding this matter to L. B. Jones at (704) 382-4753.

Sincerely,

Thomas C. Geer
Vice President, Nuclear Engineering

Attachments

Table 1 – Errors/Evaluation Model Changes with no PCT Impact
Table 2 – Peak Cladding Temperature Summary – McGuire Units 1 & 2 and Catawba Unit 1
Table 3 – Peak Cladding Temperature Summary – Catawba Unit 2

xc: (with attachments)

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ATTACHMENTS

Table 1 – Errors/Evaluation Model Changes with no PCT Impact

Table 2 – Peak Cladding Temperature Summary – McGuire Units 1 & 2 and Catawba Unit 1

Table 3 – Peak Cladding Temperature Summary – Catawba Unit 2

Table 1
Errors / Evaluation Model Changes with no PCT Impact

Discretionary Changes:

General Code Maintenance (NOTRUMP Model)

These changes (i.e., modifying variable input definitions, units, and defaults, eliminating inactive coding, optimizing active coding, improving input diagnostic checks, and enhancing code output) enhance code usability to help preclude errors in analyses and have no PCT impact.

Non-Discretionary Changes:

Errors in Reactor Vessel Nozzle Data Collections (WCOBRA/TRAC Model and NOTRUMP Model)

Minor errors in the reactor vessel nozzle data collections can potentially affect the vessel inlet and outlet nozzle fluid volumes, metal mass, and surface area. These minor differences were evaluated to have a negligible effect on LBLOCA and SBLOCA analysis results. Therefore, the estimated PCT impact of these errors is zero for 50.46 reporting purposes.

HOTSPOT Fuel Relocation (WCOBRA/TRAC Model)

In the axial node where burst is predicted to occur, a fuel relocation model in HOTSPOT is used to account for the likelihood that additional fuel fragments above that elevation may settle into the burst region. The calculated effect of this relocation was being calculated correctly, but then later cancelled out in the coding. Using correcting coding, the HOTSPOT 95% probability PCT results were used to establish plant specific penalties, which were zero for McGuire/Catawba units.

Steam Generator Nozzle Volume Accounting Error (WCOBRA/TRAC Model)

Steam generator plenum nozzle volumes were double accounted, resulting in an error of 7-9 ft^3 per nozzle. RCS loop inventory does not significantly contribute to core cooling during blowdown since most of the fluid in both the intact and broken RCS loops will exit the break without entering the core. Therefore, a small volume error of this nature is anticipated to be negligible throughout the transient, such that the estimated PCT impact of this error is zero for 50.46 reporting purposes.

Refined Break Spectrum (NOTRUMP Model)

The NRC has generically questioned whether the 1.5, 2.0, 3.0, 4.0, and 6.0 inch break spectrum is fine enough to capture the worst break location with regard to the overall limiting PCT results (i.e., both large and small break). Since McGuire/Catawba SBLOCA results are significantly non-limiting compared to large break results, no explicit refined break spectrum calculations were performed and the estimated PCT impact of this change is zero for 50.46 reporting purposes.

Pump Weir Resistance Modeling (NOTRUMP Model)

Reactor coolant pump weir resistances were double accounted. Resolving the identified discrepancies were identified as having negligible effect on existing results, leading to an estimated PCT impact of zero for 50.46 reporting purposes.

Table 2
Peak Cladding Temperature Summary – McGuire Units 1 & 2 and Catawba Unit 1

LBLOCA	Cladding Temp (°F)	Comments
Evaluation model : WCOBRA/TRAC		
Analysis of record PCT	2028	MNS/CNS Composite Model
Prior errors (ΔPCT) 1. Decay heat in Monte Carlo calculations 2. MONTECF power uncertainty correction 3. Safety Injection temperature range 4. Input error resulting in an incomplete solution matrix 5. Revised Blowdown Heatup Uncertainty Distribution 6. Vessel Unheated Conductor Noding	 8 20 59 25 5 0	 Reference A Reference B Reference C Reference D Reference E Reference F
Prior evaluation model changes (ΔPCT) 1. Revised Algorithm for Average Fuel Temperature	0	Reference F
Errors (ΔPCT) 1. None	0	
Evaluation model changes (ΔPCT) 1. None	0	
Absolute value of errors/changes for this report (ΔPCT)	0	
Net change in PCT for this report	0	
Final PCT	2145	
SBLOCA		
Evaluation model : NOTRUMP		
Analysis of record PCT	1323	Reference G
Prior errors (ΔPCT) 1. None	0	
Prior evaluation model changes (ΔPCT) 1. None	0	
Errors (ΔPCT) 1. None	0	
Evaluation model changes (ΔPCT) 1. None	0	
Absolute value of errors/changes for this report (ΔPCT)	0	
Net change in PCT for this report	0	
Final PCT	1323	

Reference:

A) letter, M. S. Tuckman (Duke) to USNRC, "Report Pursuant to 10 CFR 50.46, Changes to or Errors in an ECCS Evaluation Model", May 3, 2001
B) letter, M. S. Tuckman (Duke) to USNRC, "Report Pursuant to 10 CFR 50.46, Changes to or Errors in an ECCS Evaluation Model", April 3, 2002
C) letter, W. R. McCollum, Jr. (Duke) to USNRC, "Report Pursuant to 10 CFR 50.46, Changes to or Errors in an ECCS Evaluation Model", July 29, 2003
D) letter, W. R. McCollum, Jr. (Duke) to USNRC, "Report Pursuant to 10 CFR 50.46, Changes to or Errors in an ECCS Evaluation Model", May 26, 2004
E) letter, J. R. Morris (Duke) to USNRC, "Report Pursuant to 10 CFR 50.46, Changes to or Errors in an ECCS Evaluation Model", June 21, 2005
F) letter, T. C. Geer (Duke) to USNRC, "Report Pursuant to 10 CFR 50.46, Changes to or Errors in an ECCS Evaluation Model", March 13, 2007
G) letter, T. C. Geer (Duke) to USNRC, "Report Pursuant to 10 CFR 50.46, Changes to or Errors in an ECCS Evaluation Model", May 22, 2007

Table 3
Peak Cladding Temperature Summary – Catawba Unit 2

LBLOCA	Cladding Temp (°F)	Comments
Evaluation model : WCOBRA/TRAC		
Analysis of record PCT	2028	MNS/CNS Composite Model
Prior errors (ΔPCT) 1. Decay heat in Monte Carlo calculations 2. MONTECF power uncertainty correction 3. Safety Injection temperature range 4. Input error resulting in an incomplete solution matrix 5. Revised Blowdown Heatup Uncertainty Distribution 6. Vessel Unheated Conductor Noding	 8 20 59 25 5 0	 Reference A Reference B Reference C Reference D Reference E Reference F
Prior evaluation model changes (ΔPCT) 1. Revised Algorithm for Average Fuel Temperature	0	Reference F
Errors (ΔPCT) 1. None	0	
Evaluation model changes (ΔPCT) 1. None	0	
Absolute value of errors/changes for this report (ΔPCT)	0	
Net change in PCT for this report	0	
Final PCT	2145	
SBLOCA		
Evaluation model : NOTRUMP		
Analysis of record PCT	1243	Reference G
Prior errors (ΔPCT) 1. None	0	
Prior evaluation model changes (ΔPCT) 1. None	0	
Errors (ΔPCT) 1. None	0	
Evaluation model changes (ΔPCT) 1. None	0	
Absolute value of errors/changes for this report (ΔPCT)	0	
Net change in PCT for this report	0	
Final PCT	1243	

Reference:

A) letter, M. S. Tuckman (Duke) to USNRC, "Report Pursuant to 10 CFR 50.46, Changes to or Errors in an ECCS Evaluation Model", May 3, 2001
B) letter, M. S. Tuckman (Duke) to USNRC, "Report Pursuant to 10 CFR 50.46, Changes to or Errors in an ECCS Evaluation Model", April 3, 2002
C) letter, W. R. McCollum, Jr. (Duke) to USNRC, "Report Pursuant to 10 CFR 50.46, Changes to or Errors in an ECCS Evaluation Model", July 29, 2003
D) letter, W. R. McCollum, Jr. (Duke) to USNRC, "Report Pursuant to 10 CFR 50.46, Changes to or Errors in an ECCS Evaluation Model", May 26, 2004
E) letter, J. R. Morris (Duke) to USNRC, "Report Pursuant to 10 CFR 50.46, Changes to or Errors in an ECCS Evaluation Model", June 21, 2005
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G) letter, T. C. Geer (Duke) to USNRC, "Report Pursuant to 10 CFR 50.46, Changes to or Errors in an ECCS Evaluation Model", May 22, 2007